

## CLAIMS

*ent*  
*a3* ~~Having thus described my invention, what I~~  
~~claim as new and desire to secure by Letters~~  
~~Patent is as follows:~~

- 1 1. A method of measuring overlay alignment of  
2 sequential lithographic exposures, said method  
3 including steps of  
4 forming first separated features on a  
5 surface,  
6 forming second separated features on said  
7 surface interleaved between said first separated  
8 features, and  
9 illuminating said first and second separated  
10 features and detecting an interference pattern.
- 1 2. A method as recited in claim 1, including the  
2 further step of calculating a spectrographic  
3 response corresponding to said interference  
4 pattern.
- 1 3. A method as recited in claim 1, wherein said  
2 illuminating and detecting step is performed with  
3 a specular spectroscopic scatterometer.
- 1 4. A method as recited in claim 3 wherein said  
2 scatterometer is of the reflectometer type.
- 1 5. A method as recited in claim 3 wherein said  
2 scatterometer is of the ellipsometer type.
- 1 6. A method as recited in claim 5, wherein said  
2 ellipsometer measures complex reflectivity  
3 spectral ratio for two orthogonal polarizations  
4 with broadband illumination.

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1 7. A method as recited in claim 1 wherein said  
2 illumination is broadband light.

1 ~~SUB~~ 8. A metod as recited in claim 1 wherein said  
2 ~~Cle~~ detection measures ~~amplitude~~ and phase.

1 9. A method as recited in claim 1, wherein said  
2 illumination and detection step results in  
3 measured spectral curves and including the further  
4 steps of  
5 modelling said first and second features by  
6 simulation to obtain simulated spectral curves,  
7 and  
8 comparing said measured spectral curves with  
9 said simulated spectral curves.

1 10. A method as recited in claim 9, wherein said  
2 comparing step includes use of an optimization  
3 technique to determine best fit and to quantify a  
4 misalignment value.

1 11. A test mark including  
2 a plurality of marks formed by a lithographic  
3 exposure,  
4 a mark formed between said plurality of marks  
5 by another lithographic exposure,  
6 said mark and said plurality of marks forming  
7 a periodic structure.

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1 <sup>SUB</sup> 12. A non-imaging metrology apparatus comprising  
2 <sup>B.</sup> means for storing spectral curves,  
3 a specular spectroscopic scatterometer for  
4 measuring reflection from a plurality of marks  
5 formed by two lithographic exposures and forming a  
6 periodic structure, and <sup>B</sup>  
7 means for comparing processed signals output  
8 from said specular spectroscopic scatterometer  
9 with said spectral curves to evaluate misalignment  
10 of said two lithographic exposures.

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